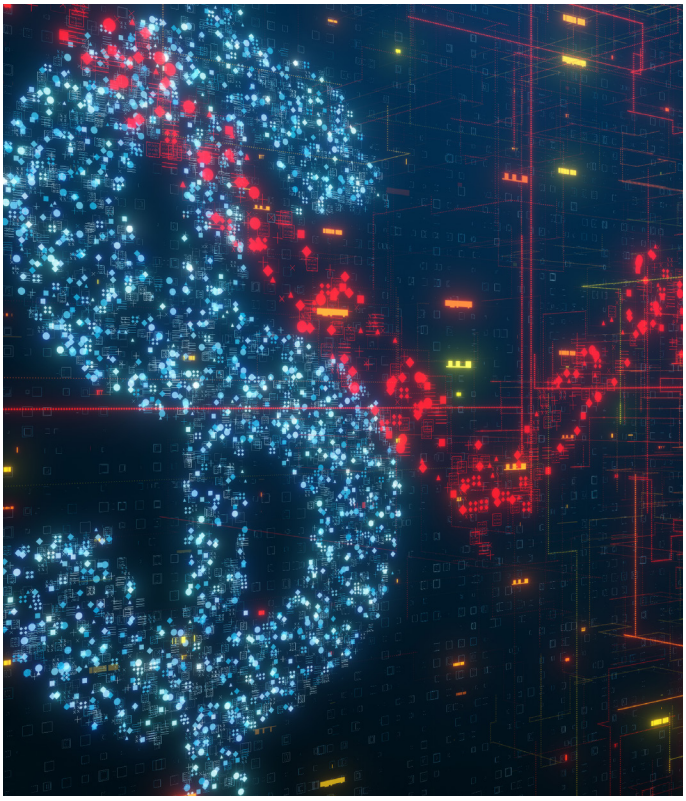
SOCIETY OF ACTUARIES
INVESTMENT SECTION

RISKS & REWARDS
JUNE 2020

Taking Stock: Are We Setting Ourselves Up for High Inflation?

By Nino Boezio



When the global financial crisis of 2008–09 was in full swing, the price of gold at one point jumped dramatically over the course of several hours. The U.S. Federal Reserve announced another policy initiative that according to traditional economic and financial thinking would be highly inflationary.

The price of gold receded over the next several days as investors correctly surmised, based on the slack that existed in the economy and financial system, that the Fed's policy should not be too inflationary if at all.

Over the ensuing years, the Fed's prevalent policy of buying debt instruments introduced liquidity into the financial and economic system but occasionally also raised the specter of inflation. As subsequently observed however, the liquidity introduced was sorely needed and it did not produce inflation at the consumer level. Instead, it led to asset inflation as real estate prices revived, the stock market rebounded and interest rates declined as bonds were more widely purchased.

The Fed also put itself into a backstop role. Investors became more confident that the Fed would step in once again if another crisis developed. Other central banks adopted a similar policy as these saw the Fed's approach as being successful overall.

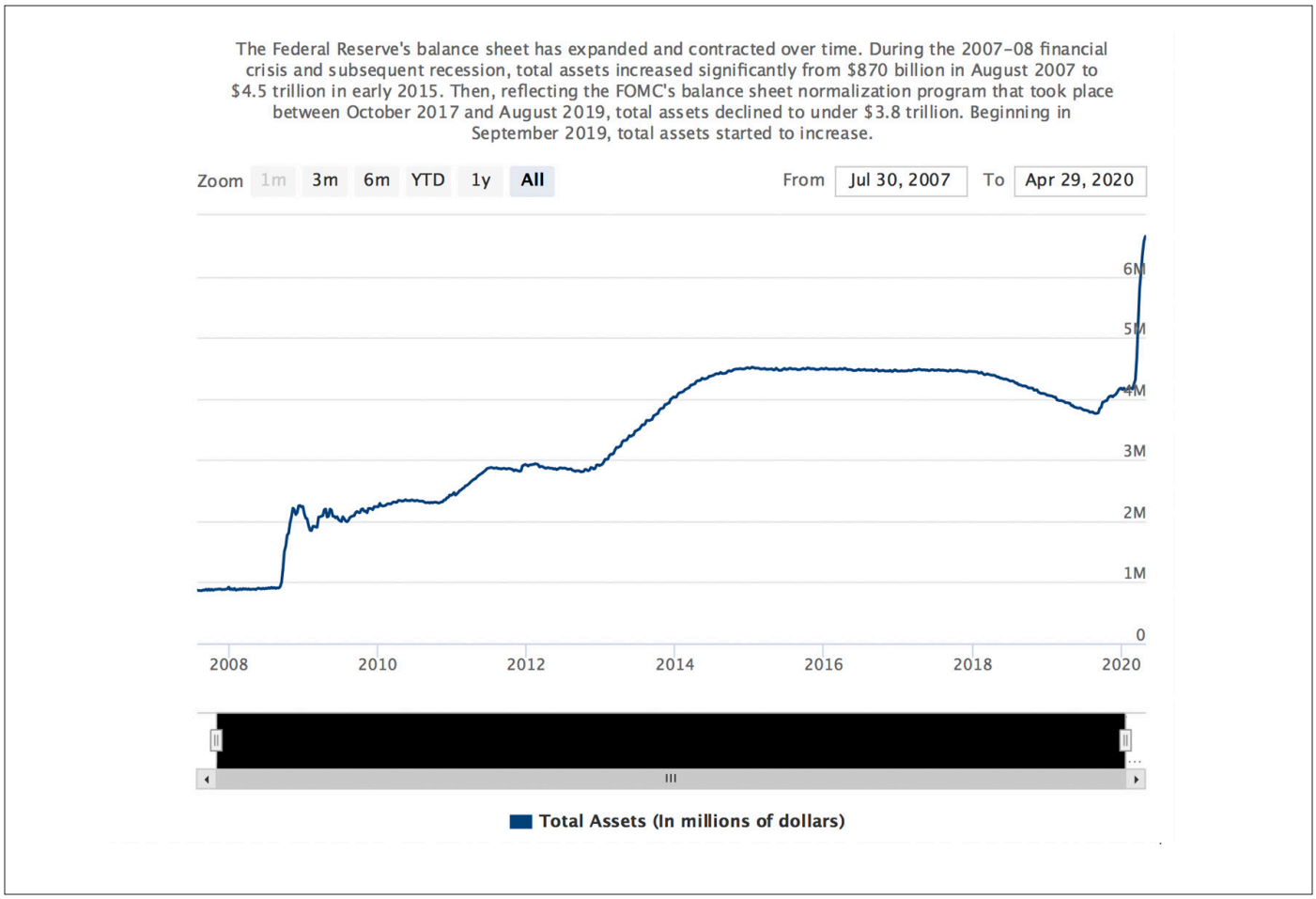
These central bank actions helped make high debt levels look less troubling. The obligations appeared sustainable. Under natural forces of supply and demand, investors would demand a higher interest payment if the supply of debt is high. But when a central bank becomes a major buyer of these securities, excess supply does not pose as much of a problem and the interest rates charged or demanded by investors become suppressed.

Given the current pandemic crisis, many governments around the world are stepping forward aggressively to financially support their domestic economies. We are looking at trillions of dollars in stimulus and relief to be financed ultimately through new debt. As was witnessed after the global financial crisis, a policy of austerity to balance budgets as practiced in parts of Europe did not truly work, so it is preferable for governments to spend.

Many countries were already dealing with high debt before this pandemic outbreak. As a result of this crisis, debt levels of many more countries will be pushed beyond realistic limits, points at which this new debt is never expected to be repaid.

Given this current pandemic crisis, central banks will once again become a major purchaser of the excess bond supply which will result in keeping interest rates low. The U.S. Federal Reserve for example (as shown in Figure 1) has already expanded its balance sheet to well over $6 trillion, up from just below $4 trillion a few months ago, and from $870 billion before the Global Financial Crisis of 2008–09.[1]

Figure 1
U.S. Federal Reserve Balance Sheet Expansion



This does raise the question as to whether the intervention of central banks will at some point break down and no longer produce the hoped-for results. After all, it is rather strange to have one agency of government (even though technically independent) buy the debt of another government entity. But it is expected that this central bank policy will continue globally, until it no longer works.

HIGH DEBT—HOW DID WE GET SO FAR?

The notable economist John Maynard Keynes of the 1930s proposed a different approach to dealing with economic downturns. I would summarize it this way. In bad economic times, a government can borrow and spend the money to stimulate the economy. In good economic times, the government pulls out the money (such as through taxes) and pays the debt back.

This Keynesian approach is very simple and makes sense. It should flatten the peaks and valleys of the economic cycle. Previously, adding debt to government balance sheets was not viewed favorably.

However, as governments began to adopt this new way of fiscal thinking, the principles began to change. Governments would be spending all the time and borrowing all the time.

In good economic times, governments would still spend to make a strong economy even stronger, since that would help them get re-elected. Generally, voters hold a detachment to government debt, considering it to not be theirs. If a government did attempt to reduce debt, it would not get much credit for its heightened sense of fiscal stewardship. The government would appear less successful. If social programs and spending initiatives were cut these would not often be viewed positively. As we probably know, it is preferable not to give people something than to give them something and later take it back. Such is the case with the voter electorate.

Many people benefitted from this higher level of government spending, especially as social programs were introduced and expanded. But the result of this new government behavior was that many countries reached debt levels that were high (albeit still manageable). This was true until the global financial crisis

of 2008–09 and when the Greek debt crisis of 2015 arose. These events pushed many countries towards debt levels that were less sustainable as the economies also suffered.

CASE STUDY—HYPERINFLATION IN VENEZUELA AND MODERN MONETARY THEORY

In 1998, Hugo Chávez was elected president of Venezuela. The government enjoyed a significant rise in revenue in large part due to the increased export of oil and related products. In response, Chávez used some of the new income to expand social programs. These helped reduce poverty and improved the health of the country's citizens.

Even though a certain degree of financial mismanagement, corruption and overspending was also occurring, significant problems did not surface during the first decade. But eventually the country began to experience quickly deteriorating financial conditions and a growing shortfall in the government's balance of payments. In response, Chávez in June 2010 took strong action in an attempt to mitigate and possibly reverse the economic and financial decline.

Coupled with subsequently falling oil prices, economic and financial conditions within Venezuela worsened. The country eventually faced hyper-inflation, supply shortages, social unrest, increased poverty and starvation, national protests and a string of political crises. The country defaulted on its debt. The problems in Venezuela are still ongoing.

Venezuela had embarked on a more traditional approach in dealing with its economic crisis. It also introduced price control measures. All of its policies could not reverse the loss of confidence in the country, stop rising inflation, and prevent further economic deterioration and debt default.

However, it would be interesting to step back and speculate on how the situation would look if the Venezuelan central bank bought back government debt, as we witnessed with many of the major economies in the past decade.

These actions sometimes fall under the label Modern Monetary Theory (MMT). Under MMT, a government can supplement the shortfall in paying its obligations through debt rather than taxation, where the new debt is significantly absorbed through the central bank.

Whether investors would fully accept such a central bank approach for a smaller country or economy such as Venezuela is somewhat debatable. But such an action would prevent any bond default. The central bank would buy any debt that no one would want or purchase any supply investors could not absorb.

It could delay a crisis in investor confidence. A budget imbalance where government revenue is not sufficient to cover all of its obligations becomes less visible to many investors, since they may not fully understand what is taking place.

Adherents of MMT do cite that this approach has inflation risk. Therefore, they would argue that raising taxes and issuing additional bonds will help take out the monetary excesses once inflation appears. In addition, other mechanisms adjust in reaction to the imbalance of payments such as the currency exchange rate.

Applying an MMT approach does help to produce stability in the bond market as the net issuance of bonds to the public does not have to change drastically. Depending on the volume at which bonds are purchased by the central bank, the interest rate charged is somewhat controlled. Bond defaults never need to occur.

However, we should be aware that no fiscal or monetary policy provides a "free lunch." In the case of Venezuela, even with the application of MMT, we would anticipate a point where foreign investors for example, observing the internal conditions of the country, will not want to invest in the country's securities at previous prices or at any price. They would see the balance of payments continuing to be too imbalanced and not improving. Trade is faltering. The currency exchange rate begins to suffer. Confidence in government policy and the domestic economy would still decline.

Despite an application of MMT, there would still have to be a breakdown. It cannot compensate for fiscal mismanagement. High inflation would result and despite any efforts to stimulate the economy, most policies would fail.

However, it does appear that MMT could have softened the blow of the Venezuelan crisis in the initial stages, as big financial and debt impacts could have been avoided and the transitions or adjustments could have been more gradual.

Venezuela would not be a special case. Any economy would begin to suffer when its excesses go too far, regardless of what economic or monetary theory is being applied. This should provide a warning to us that central bank mechanisms cannot compensate indefinitely for the problems or mismatches occurring in other areas of government or the economy.

REVIEWING THE WORLD OF THE PAST 10 YEARS

As we have probably noted through presentations we personally attended or from items we have read, many countries in the past decade no longer had the reserves to deal with another emergency. Central banks became the mainstay to absorb the higher levels of debt governments were now incurring—otherwise the supply of debt was too risky and too enormous for private investors to absorb and accept.

The purchase of debt instruments by central banks would normally be considered inflationary as they would introduce more "money" into the financial system. Beneficiaries of the new debt were the issuing governments. Through their spending, governments would be engaging in policies that will normally be inflationary.

But our global economy has also been experiencing a number of deflationary pressures at the same time. Demographics have been a negative. For many sectors, industrial capacity had still not reached high levels. Various financial crises including Brexit reduced economy activity. Cheaper labor and production costs in other parts of the world kept prices of many consumer goods low. Central banks have operated under a backdrop where rather inflationary policies were largely offset by deflationary influences.

The current pandemic will have deflationary implications. Some have postulated that this pandemic could have major ramifications for the economy for two or more years. This will depress economic performance locally and globally. Under these conditions, central banks will be induced once again to take a very active role.

Obviously, our world can change dramatically. Global demographics have suggested that interest rates would remain low for a long time because we have an aging global population that gradually consumes less. But this can now change in the not-too-distant future.

Government debt now has to increase dramatically. History shows that pushing domestic debt too far will undermine an investor's confidence to sustain that financial system. So far central banks have been able to maintain and restore stability in many of the economies they oversee. But that does not mean it will continue to work indefinitely.

It is hard to say when a high debt level is overly high, especially when a central bank is involved. But it should raise concerns when a government realistically cannot pay it back. So far that is not something that is taken seriously for many financial systems.

CAN THE COST OF THE PANDEMIC BE COVERED THROUGH HIGHER TAXES?

Governments are facing deep drops in revenue while also incurring the unanticipated costs of any stimulus and relief they provide. The revenue of most governments comes through taxes.

Could governments pay down debt through additional tax revenue? For examination and illustration purposes, consider U.S. data. The U.S. is not in any particular better or worse shape than many other countries, but it has good information for us to examine.

The U.S. total revenue for fiscal 2021, most of which comes from taxes (prior to the crisis' impact) was estimated to be $3.8 trillion.[2] The U.S. federal government was expected to still run a deficit of almost $1 trillion (i.e., $966 billion).

The current amount of U.S. government stimulus has a price tag of approximately $2.2 trillion, and there could be additional spending to come. Considering the decline in tax revenue that is now expected, the U.S. government will likely have little to nothing left to fund its regularly scheduled annual activities. Therefore, the additional costs will have to be covered through additional debt. If the U.S. were to double the revenue it receives through taxes, it may only be able to break even for its current fiscal year.

Of course raising taxes faces a number of obstacles. It will face impediments from the political process. Taxpayers will protest if taxes rise substantially. For any political party, raising taxes too much could be political suicide. In addition, higher taxes will slow the economy.

The biggest problem is the numbers are just too large. The amount of money required is too high. The cost of this pandemic is proving very expensive. Can we realistically double the revenue a government receives through taxes, even if we spread the tax increases over a decade or so? The specter of increasing taxes raises a number of challenges.

A popular mantra that also arises occasionally is that we should tax the wealthy. But we need to realize that this group is not earning enough or is wealthy enough to cover all of the country's financial needs. Consider their assets.

The number of billionaires in the United States was reported to be 609 in 2019.[3] The number of millionaires in the U.S. was reported as 18.6 million (i.e., a net worth of $1 million or more).[4] The U.S. total federal debt could reach $30 trillion as a result of this crisis. If we take $1 billion from each billionaire and $1 million from each millionaire, this would raise about $19.2 trillion in new revenue.

The U.S. could then whittle away over half of its federal debt through this approach. But this would require a seizure of assets (an extreme measure) since these persons do not make a similar amount of income annually (i.e., earn only a fraction of their net

History shows that pushing domestic debt too far will undermine an investor's confidence to sustain that financial system.

worth as income and for which they are already paying taxes). Additionally, after the asset seizure, many of these people will have almost no net-worth left. Having a net-worth of $1 million is also not a comfortable position for many people anymore, as they have health concerns and find that the cost of living keeps increasing.[5] A million dollars today is not that much, so if we just consider multi-millionaires (i.e., those with a net-worth of $5-30 million), the number of persons in this category falls to 1.05 million.[6]

We do not have a lot of room to cover costs through taxing the wealthy, since there is not much of a base to work with in this group. We should also not forget the impact of estate and inheritance taxes that are already pending on any assets.

Raising taxes appears to be a non-starter for a variety of reasons. The amount of new tax revenue required is simply too big. This will be a dilemma faced by most countries around the world.
It would, therefore, be best for any government to assume a larger amount of debt and hope that, through the help of central banks, it will be able to manage it.

INFLATION IS THE NASTIEST BUT POTENTIALLY THE ULTIMATE SOLUTION

No one truly likes inflation. It hurts people and economies. It creates uncertainty. But traditionally, it is one of the ways that puts a government's financial system back into balance.

Traditionally, if a government could not pay back its debt, the debt either had to be extinguished (such as through default) or devalued (such as through inflation). Given the central bank approach today, bonds need not default, unless we are dealing with a government or central bank that is taking a totally different direction (as was the case with Venezuela). That means that inflation could be the only real solution if debt and the ability for a country to service it, runs out of control.

Default is a problem because it damages the credibility of the borrower. It destroys the confidence of the lender to lend once again. But it has been one of the previous ways a government could put its revenue back into synchronization with its expected outflow.

Inflation is another solution which is a subtle form of default. The lender was expecting to receive a return of capital and earn interest payments that had a certain real value in terms of purchasing power. Through inflation, a government can receive an increase in revenue in nominal terms, while reducing the value of its debt in real terms, since most of its debt was issued at a pre-determined value non-indexed to inflation.

WHAT CAN WE EXPECT GOING FORWARD?

Central banks will accommodate the higher levels of debt incurred as a result of this pandemic. They will seek to keep interest rates low so that the governments could afford these obligations. Central banks can finance new debt obligations by buying them.

But we cannot rule out that inflation can become a problem eventually (so far we have just experienced asset inflation). Central banks can only go so far. We could find that there will be a crisis of confidence with respect to various countries in the foreseeable future. These could have ripple effects around the world (contagion) and raise concerns about which country will be next, even if another country is in better shape.

Our western economies have been able to enjoy a certain level of stability despite the challenges of the past decade. But we need to be on guard for a potential shift in the financial and economic situation globally and with respect to various countries.

If inflation does become a problem, central banks will have a difficult job on their hands and our sense of individual financial security will be jeopardized. We need to be prepared for a potential global shift where despite the effort of central banks, the levels of debt for various countries still become of grave concern and very high inflation begins to surface. ■

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ENDNOTES

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Chairperson's Corner

By Hal Pedersen

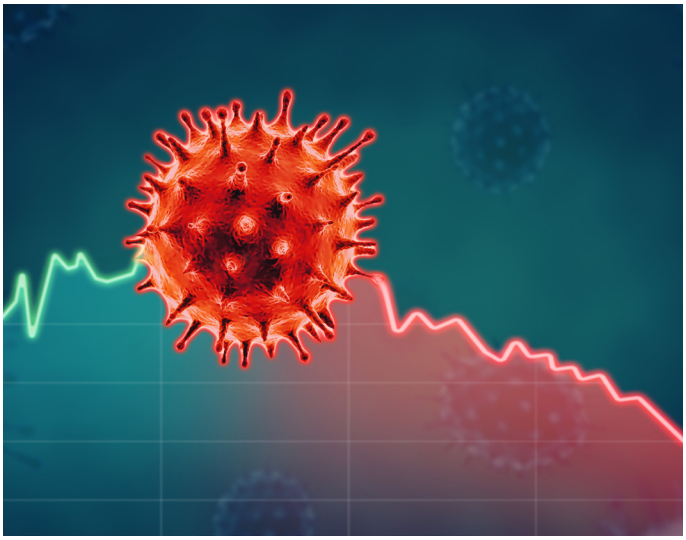
A career as an investment professional is one that I have found fascinating ever since my first experience as a summer student at an insurance company in 1987. At the time, stochastic interest rate models were relatively new, derivatives markets were rapidly developing and Black Monday (Oct. 19, 1987) was just around the corner. The early 1990s brought the brisk expansion of the variable annuity (VA) businesses for many U.S. insurers and it was an exciting time for financial innovation in insurance. Opportunities for the application of financial economics to insurance practice were everywhere. The catastrophic problems some insurers would face with their VA businesses were still a long way in the future. Most practitioners believed they had a pretty good handle on financial risk and as the technology advanced the situation could only improve. Of course, a collapse like what would occur during the financial crisis 25 years later was acknowledged as a remote possibility; but it had to be considered, given what had happened during the Great Depression. The early 1990s was also the beginning of the conquest of inflation,[1] as major central banks around the globe began a disciplined approach to inflation targeting. But we did not then know inflation was dead because the targeting approach had just begun. One thing we knew for sure though, interest rates must always be non-negative since investors could always stuff cash in their mattresses.

The financial crisis and its aftermath have led to global market conditions with few parallels in the historical record. We are all acutely aware that ultra-low long-term interest rates have placed tremendous stress on life insurers and made it very difficult to generate yield on investment portfolios while maintaining an acceptable risk profile. Until recently, it seemed that markets were primed to return to more normal conditions and there was a focus on what that normalization process might look like. Suddenly, we have found ourselves in the early innings of what might be called the first "planned recession"; to paraphrase the words of the venerable Art Cashin.[2]

In response, the Federal Reserve has set the Fed funds rate back to zero, the 30-year U.S. treasury bond is yielding a little better than one percent, and the Federal Reserve is back in aggressive quantitative easing mode. The April 29, 2020 Fed Press release stated: "… the Committee decided to maintain the target range for the federal funds rate at 0 to 1/4 percent. The Committee expects to maintain this target range until it is confident that the economy has weathered recent events and is on track to achieve its maximum employment and price stability goals." It would appear that we are now locked into zero interest rates for quite some time. Even so, U.S. bond yields are higher than those of most major economies. It is a challenging time to be an investment professional!

The natural state of affairs in investment practice is uncertainty wherein the sources and level of uncertainty vary over time but for which uncertainty predominantly comes from the fluctuation of known variables. We are now confronted with a new source of uncertainty in the form of the coronavirus pandemic and it is one that is outside the expertise of most investment professionals. The Investment Section organized and jointly sponsored a town hall on COVID-19 and its implications for capital markets. It was delivered on April 19 to help summarize what we know so far, explore plausible outcomes for capital markets and insurance operations, and provide a discussion forum for our section members.

Perhaps it is the ever-changing landscape we operate in that makes the career of an investment professional so interesting.



Under what one might call "good economic conditions," a range of relatively conservative assets with positive real yields can be chosen from. In this world, an investor of moderate skill can make satisfactory returns and is not under any great pressure to reach for yield. In contrast, a deep understanding of asset classes and their characteristics is vital for survival in the economic environment of today, wherein the reach for extra yield is fraught with many entangled and mutating risks. The insights, skill and judgment of investment professionals is needed now more than ever; even as consolidation and automation have eliminated some jobs. Our global investment universe is becoming ever more complex and is impossible to navigate without the help of well-trained investment professionals. It is tempting to reflect on days gone by as a "golden age," but I think the truth is that the best time to be an investment professional is right now.

The mission statement of the Investment Section is: "… to provide section members and affiliates with the needed content and resources to incorporate the most up-to-date information and investment decision-making techniques into their actuarial, risk management, and investment management work for insurance companies, pension fund sponsors, and providers of investment products to the financial services industry." In recent years we have found that webinars are an increasingly effective method to create opportunities for our section members to expand their knowledge and meet professional development requirements.

This past February we offered a professionalism town hall. In June we will offer a three-part webinar series on economic scenario generation covering basic concepts and calibration issues, validation procedures and pricing applications, and model limitations and development considerations in the current economic environment. Later in the year we plan a webinar on what is needed for a robust next generation economic scenario generator, the development of discount rates and structures, and the challenges in moving beyond the American Academy of Actuaries economic scenario generator. We will also continue the popular Investment Boot Camp series. Your section Vice-Chair Greg Roemelt, and council member and Continuing Education committee Chair Nilesh Patel are actively planning additional webinars for delivery this year. Please stay tuned for other webinars of interest to you!

The provision of timely educational opportunities such as the COVID-19 town hall is one of the most important reasons for the existence of the investment section. Each year, your investment section coordinates sessions for various Society of Actuaries (SOA) meetings and organizes webinar series and podcasts. Our section members comprise a very broad cross-section of investment experience, practice areas and interests requiring many investment section members to participate in the planning, coordination, recruitment and delivery of these important events.

We have been fortunate in having the support of many dedicated section members in serving the gamut of investment section interests. The continued success of our section depends critically on getting as many members engaged and involved in our activities as possible. You do not have to be an elected council member to contribute. Please consider taking a small step to get involved today! Not only can you share your insights and vision, but you have a chance to make a mark on investment practice and improve our meeting sessions and webinar series. Please reach out to me, David Schraub *(dschraub@soa.org)* or any other Investment Section Council member to learn about these opportunities.

This year the Investment Section has made a significant commitment to the SOA Committee on Financial Research (CFR) for funding finance research of interest to our section. Investment Section Council members Walter Wang and Dan Schobel are working with the CFR to develop applied research of interest to our section.

Our asset allocation contest is now under way and it promises to be a most interesting contest this year given the extreme uncertainty we face in the markets. Good luck to all participants!

We have been working to add new ideas and features to the Investment Section webpage *https://www.soa.org/sections/investment/* and we would love to have your feedback and suggestions. Additionally, we ask that you share some of your insights on investment issues via our LinkedIn webpage *https://www.linkedin.com/groups/2768363/*. Any member of the SOA Investment Section LinkedIn group can post and those who are not already members of the group need only to request to join the group using the link just provided. Please contact me, David Schraub *(dschraub@soa.org)* or any other Investment Section Council member to share your suggestions on how we can better serve our section members.

I wish you health and happiness in the remainder of 2020 and beyond! ■

Hal Pedersen, ASA, Ph.D. is director of the Actuarial Program at the University of California Santa Barbara. He can be reached at *halpedersen@comcast.net* or *hpedersen@pstat.ucsb.edu*.

ENDNOTES

1 I am borrowing the phrase from Tom Sargent's book, *The Conquest of American Inflation, Princeton University Press, 1999.*

2 The detailed comment is: "When you think about it, this is the first planned recession. This happened by government fiat, not because business went south. So millions of people are now out of work, as we see with the jobless claims. The market has had great difficulty adjusting to it, because the market is used to historical recessions. This wasn't caused by inflation, or asset bubbles, or bad investments, or anything else that has led to recessions in the past." *https://www.cnbc.com/2020/04/05/nyse-legend-art-cashin-gives-his-first-comments-on-the-coronavirus-sell-off-and-when-we-recover.html*

Highlights From "COVID-19: Implications for Capital Markets and Investment Modeling" Town Hall and Some Additional Commentary

By Hal Pedersen

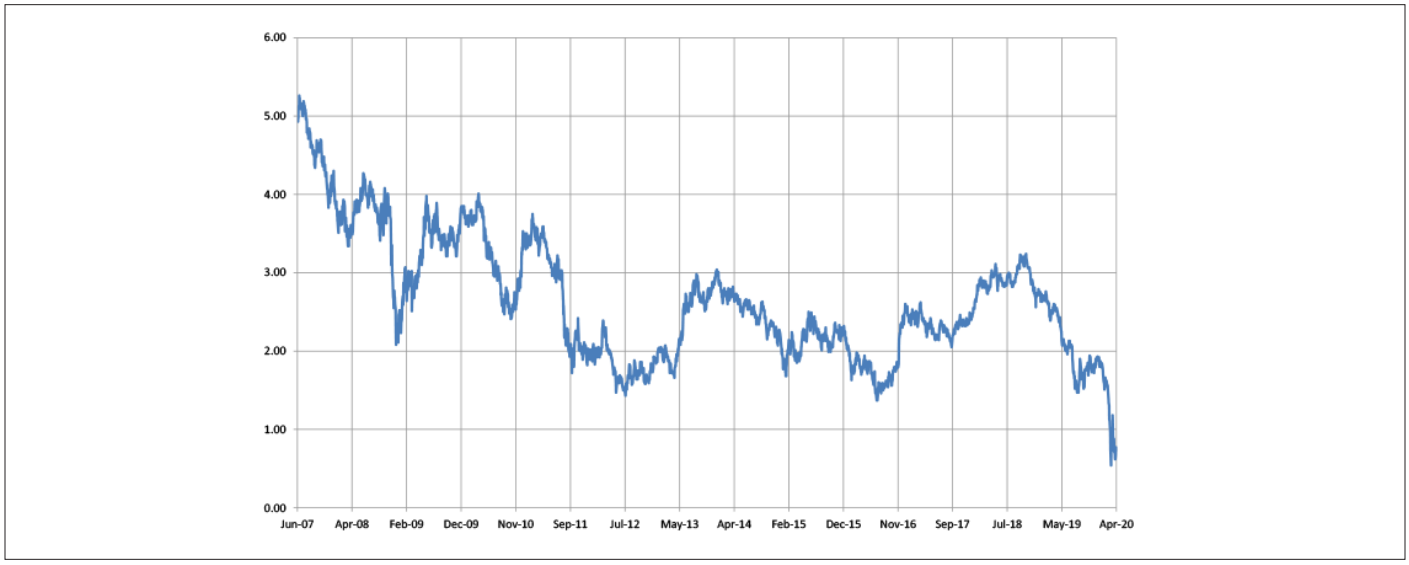
The Investment Section hosted a 60-minute town hall "COVID-19: Implications for Capital Markets and Investment Modeling," on April 24, 2020. The event was co-sponsored with the Joint Risk Management Section. The focus of the event was on the implications of the COVID-19 pandemic and the ensuing governmental and central bank policy responses for capital markets and insurance operations. It was a very lively session with approximately 150 participants.

The session panelists were Dennis Woessner, CFA, of TDAM USA; Dan Schobel, ASA, of Numerix; and Max Rudolph, FSA, CERA, CFA, MAAA, of Rudolph Financial Consulting. The moderator was Hal Pedersen, Investment Section chair.

The town hall kicked off with the moderator giving an overview of the economic and public health situation in the United States as of the third week of April, 2020. Important economic observations included:

- Fed setting of the Fed Funds rate to zero.
- Collapse of U.S. 10-year treasury yield to about 0.6 percent (i.e., 60 basis points) and an increase in the daily volatility of yield. (See Figure 1)
- Enormous increase in the number of unemployment claims with larger numbers expected.
- Total collapse in the price of oil with negative prices on May contracts.
- Shutdowns in U.S. meat processing plants leading to significant drop in production.

Figure 1
U.S 10-Year Bond Yield (Daily Data)



Source: St. Louis Federal Reserve, FRED

Data from The COVID Tracking Project[1] was used to provide a summary of the public health situation in the United States. As of April 22, 2020, there were a total of 831,370 confirmed cases of COVID-19 and a total of 42,508 deaths attributed to COVID-19. There were 2,037 deaths attributed to COVID-19 on the day of April 22, 2020. The death rate per confirmed case was about 6.5 percent. Measuring the deaths from COVID-19 is a challenge as is assessing the death rate.

The average number of deaths per day for all U.S. residents from all causes can be summarized as shown in Table 1.

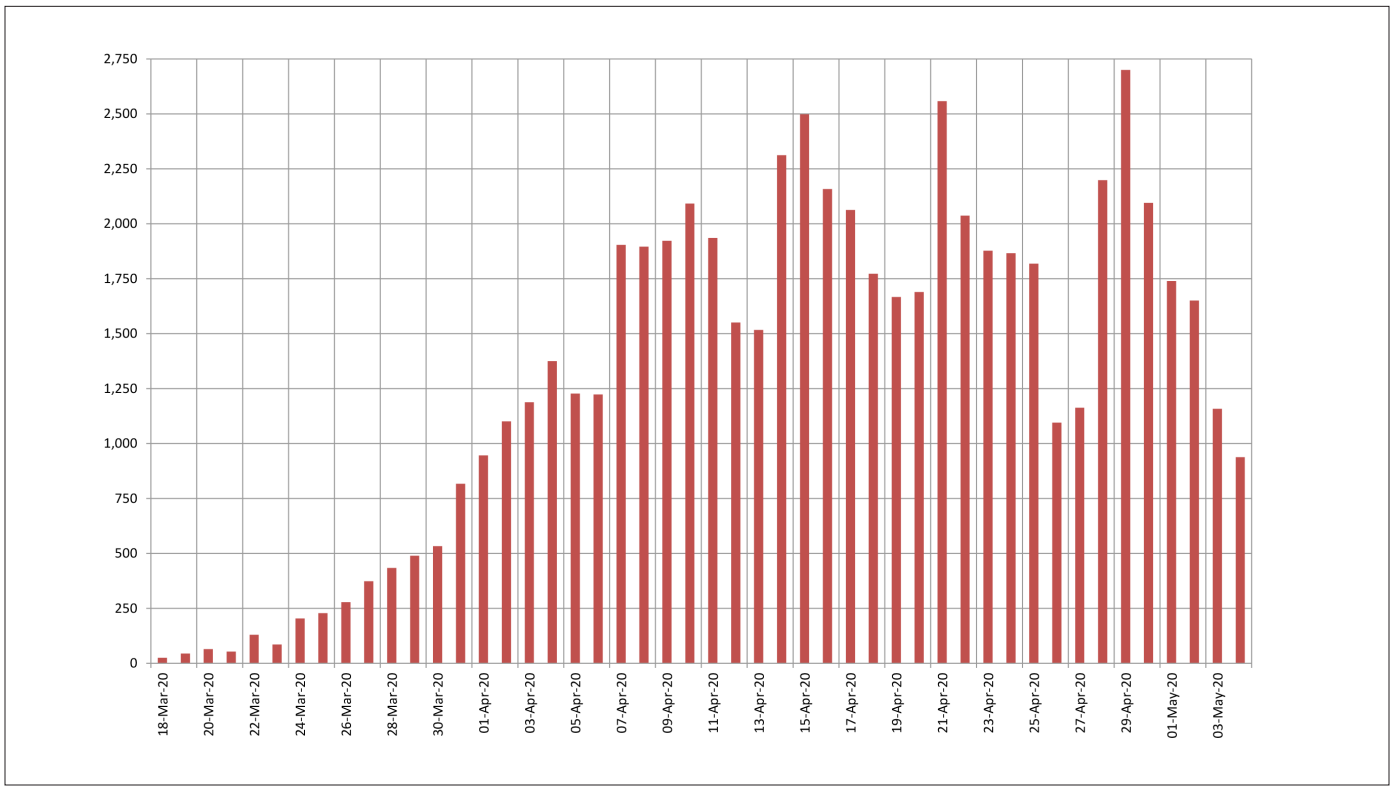
At the time of this writing, May 5, 2020, the public health situation in the United States continues to be very fluid and Figure 2 gives a snapshot.

Table 1
U.S. Deaths Per Day

	Resident Deaths (US)	Average Deaths/Day	Age Adjusted Death Rate
2016	2,744,248	7,518	0.729%
2017	2,813,503	7,708	0.732%
2018	2,839,205	7,779	0.724%

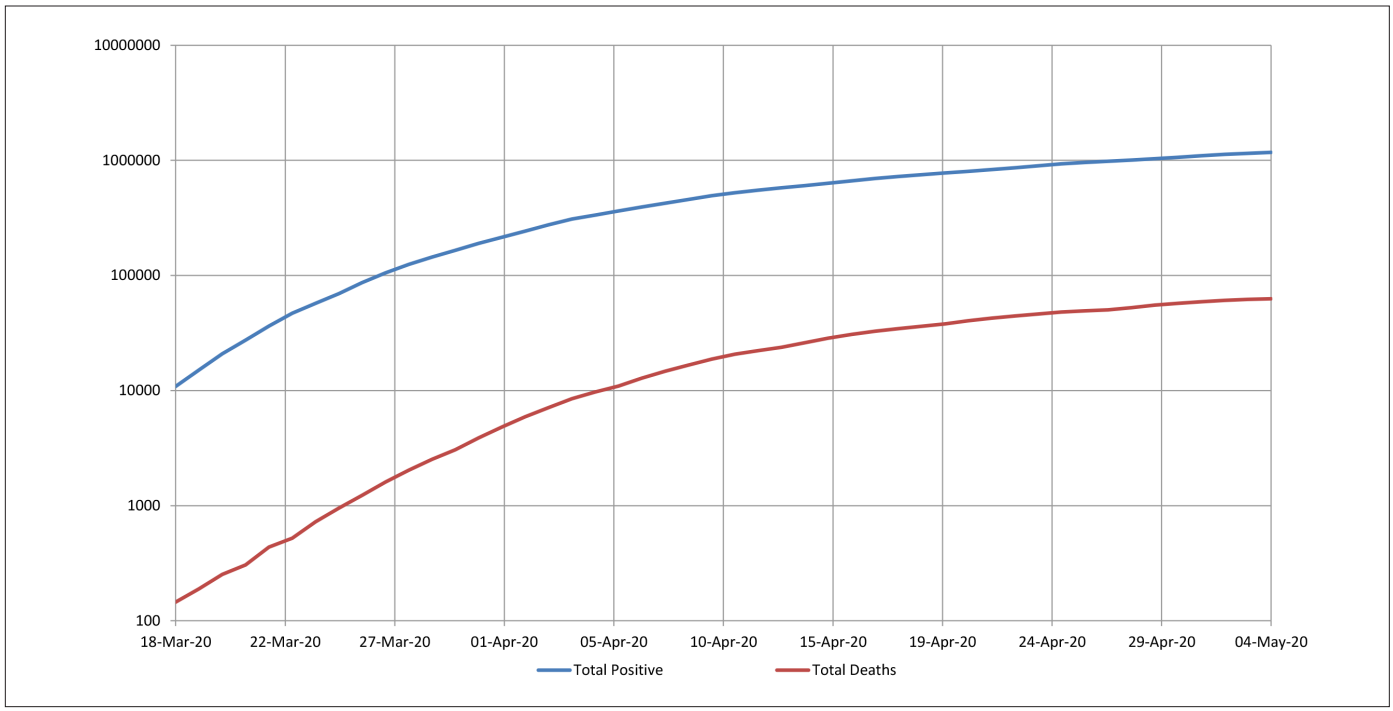
Source: National Vital Statistics Reports, U.S. Department of Health and Human Services and the National Center for Health Statistics

Figure 2
U.S. Daily Deaths Attributed to COVID-19 (March 18, 2020 to May 4, 2020)



Source: The COVID Tracking Project

Figure 3
U.S. Cumulative Positive Cases and Number of Deaths (Log Scale Base 10)



Source: The COVID Tracking Project

Table 2
U.S. Unemployment Measured by Initial Claims

Week Ended	Initial Claims (NSA)	Last Year Comparable
April 4, 2020	6,211,406	N/A
April 11, 2020	4,964,568	N/A
April 18, 2020	4,267,395	211,762

Source: U.S. Department of Labor

Social distancing measures appear to have "bent the curve," as we can see from Figure 3 that shows the total confirmed cases of COVID-19 and total number of deaths attributed to COVID-19 plotted on a logarithmic scale.

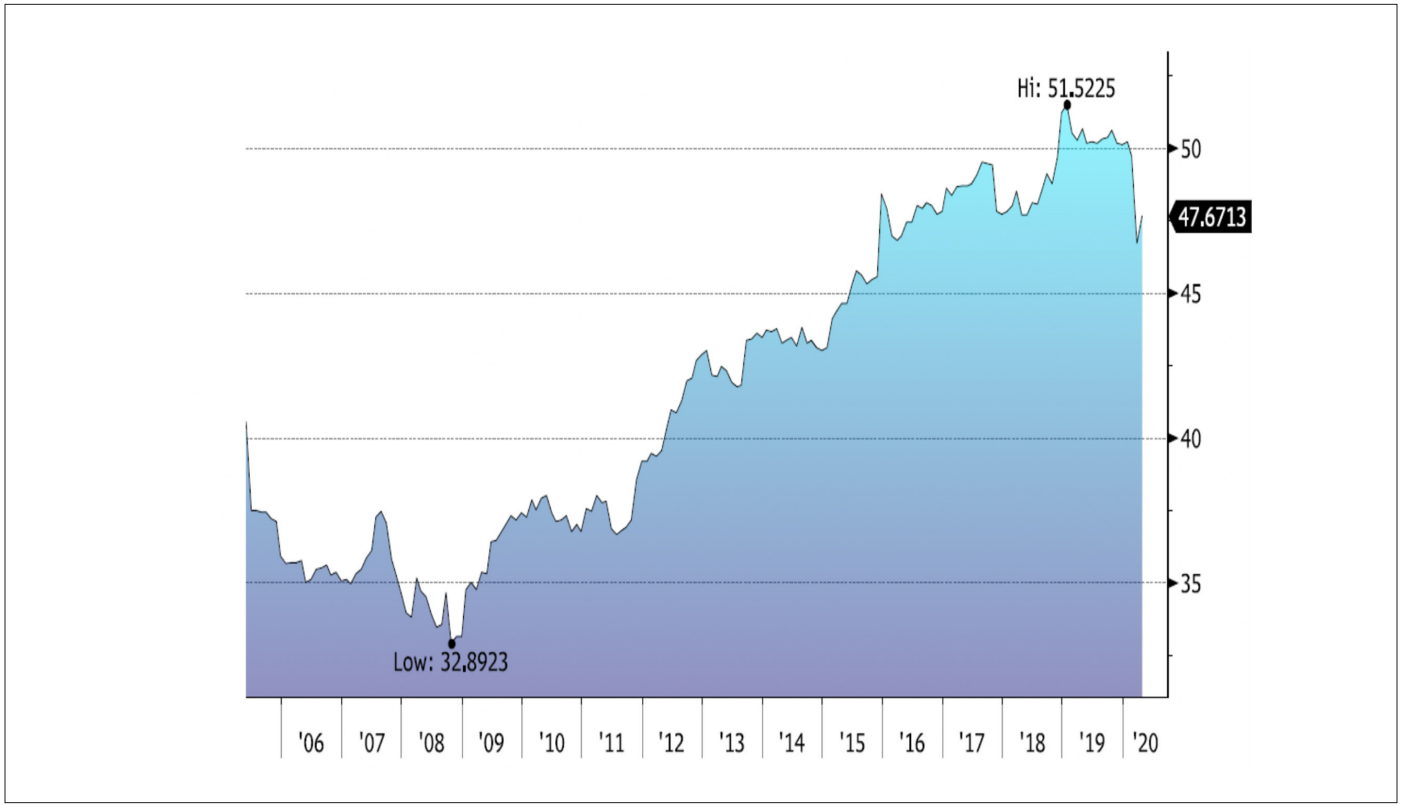
Strict social distancing policies have taken a heavy toll on the U.S. economy and employment. U.S. unemployment, measured by initial claims, is staggering. As Table 2 shows, these are very difficult times for the American worker.

The discussion then shifted to capital markets considerations. Dennis Woessner gave an insightful overview of the current situation in the markets. It was noted that central bank quantitative easing and government fiscal policy in response to COVID-19 was enormous. For example, the combined QE and fiscal stimulus in the U.S. as of April 16, 2020, was about 35 percent of GDP.

Despite the huge QE and stimulus, it was noted that inflationary pressures were likely to be muted.

Several scenarios for U.S. GDP, unemployment and inflation were discussed. A significant decline in real GDP is now baked in and unemployment in excess of 8 percent looks likely. A drop in U.S. year-over-year inflation to around 1 percent seems

Figure 4
BBB Exposure within US Corporate Bond Index



Source: Bloomberg LLP

probable, with central banks looking increasingly concerned about the prospects for deflation.

A point of potential concern is the increase in the exposure of the U.S. corporate bond market to BBB rated bonds. The following chart shows the BBB exposure within Bloomberg/Barclays U.S. Corporate Bond Index. Since BBB bonds are at the bottom of investment grade range, a serious economic shock could trigger significant rating migration downgrades. This could cause some dislocations in the bond market because many institutions would sell bonds that get downgraded to below investment grade. (See Figure 4)

Dan Schobel then walked us through some of the practical considerations that the shocks from COVID-19 have presented for economic scenario generation. Some specific examples that are cropping up in data needed for ESG work are:

- **Risk-free Curves:** Unusual yield curve shapes turning up in more economies that imply extreme forward rates. Filtering is sometimes required to ensure sufficiently smooth forward rates and resulting simulations.
- **Credit Curves:** Increased difficulty in choosing a suitable set of quotes from which to construct curves with reasonable forwards. Erratic forwards without filtering quotes can imply unreasonable long-term behavior in simulations (e.g., A-rated curve eventually crosses BBB-rated).
- **Volatility Surfaces:** Availability of swaption data is strained in recent data (e.g., March 9, 2020) and traditional measures like Black implied volatility is less reliable.

Dan also talked about some challenges in risk-neutral modeling:

- **Constant Elasticity of Variance (CEV):** Historical data far in the past suggests a moderately strong relationship between rate levels and volatility of rates. Recent historical data is challenging this assumption with historically low rate levels occurring together with high rate volatility (e.g., U.S. Treasury data in March).
- **Model Selection may need to be revisited:** Unshifted Libor Market Model (ULMM) struggles to calibrate to historically low rate environments with high interest rate volatility. Lognormal dynamics generally performing worse than normal dynamics in recent data.

- **Model Calibration:** Lack of usable volatility surface quotes on some dates (e.g., March 9, 2020) forces changes in calibration strategy/settings

There are many challenges in real-world modeling as well. It was noted that the AAA/NAIC ESG assumptions are strained due to soft floors embedded in the model. Models for commodities are not expecting or even built to accept negative oil prices.

Max Rudolph then guided the town hall through some of the broad macro issues. As a general risk management principle, Rudolph cautioned that well-established rules of thumb will no longer hold in this environment and as a result one should use first principles for strategic planning. Potential problems coming out of the crisis may well include persistent long-term low interest rates and market liquidity issues.

Rudolph asked if the response to this crisis is setting up the next one and what some of the risk interactions we should be thinking about might look like:

- Globally—Loose fiscal and monetary policy.
- Large businesses saved but small businesses allowed to fail.
- Low growth will bring some tough choices.
- Health care, education, ecosystem—changes in infrastructure and public expectations.
- High unemployment.
- Possibility of stagflation and then demographic deflation.
- Impact of demographics—age, fertility, immigration.

Rudolph noted that systemic investment risk and its management was now front and center. A focus would be made on building resilience and sustainability of a business. There are real dangers of the clustering of severe events: Pandemic plus things like crop failure, natural disasters, and wildfires, and such clustering could produce catastrophic losses for insurers.

Rudolph noted that a good assessment of these risks would be best addressed with deterministic stress tests, such as:

- CDC severe pandemic scenario;
- negative rates;
- stagflation; and
- considerations such as regional mercantilism—low growth, low energy prices, low political harmony.

The town hall then entered a question and answer session with a good amount of audience participation. Some of the questions that were addressed included:

- Where would you say the current economic scenarios fall—is this outside of a 90th or 99th percentile and how might this affect standardized model assumptions going forward?
- Is the sudden expansion of the Fed balance sheet a worry for stoking inflation?
- What is the prognosis for insurers being able to generate yield?
- How are your clients changing their ESG calibrations in response to this crisis?
- Are there historical periods that we could look at to gain insights into our scenarios?
- How do you see life insurers responding to this? Is there any reason to do anything since what do they really control?

If you find these questions of interest, please take an hour to listen to the recording of the town hall. ■

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ENDNOTES

1 *https://covidtracking.com/data*

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